Migration decisions and climate change adaptation: Synthesis findings from the Upper Indus Basin and semi-arid plains in Pakistan

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PRISE is a five-year multi-country research project, led by the Overseas Development Institute (ODI), that aims to strengthen the commitment of decision-makers in local and national governments, businesses and trade bodies for rapid, inclusive and resilience development in semi-arid regions across eight countries of Asia and Africa: Pakistan, Tajikistan and Kyrgyzstan in Asia; Kenya, Tanzania, Ethiopia, Senegal and Burkina Faso in Africa.

HI-AWARE is a consortium of five project partners lead by the International Centre for Integrated Mountain Development (ICIMOD) that aims to enhance the adaptive capacities and climate resilience of poor and vulnerable groups living in mountains and flood plains of the Indus, Ganges, and Brahmaputra River Basins that are spread across South Asian countries of Pakistan, India, Nepal and Bangladesh.

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Acronyms

ADB	Asian Development Bank
BISP	Benazir Income Support Programme
CAEWRI	Climate Change, Alternate Energy and Water Resources Institute
CARIAA	Collaborative Adaptation Research Initiative in Africa and Asia
D.G. Khan	Dera Ghazi Khan
DFID	Department for International Development
FAO	Food and Agriculture Organisation of the United Nations
FFC	Federal Flood Commission
FGDs	Focus Group Discussions
GB	Gilgit-Baltistan
GDP	Gross Domestic Product
GHI	Global Hunger Index
GLOF	Glacial Lake Outburst Floods
HDI	Human Development Index
HI-AWARE	Himalayan Adaptation, Water and Resilience Research
ICIMOD	International Centre for Integrated Mountain Development
IDRC	International Development Research Centre
IPCC	Intergovernmental Panel on Climate Change
KIIs	Key Informant Interviews
KPK	Khyber Pakhtunkhwa
NCCP	National Climate Change Policy
NDMA	National Disaster Management Authority
ODI	Overseas Development Institute
PARC	Pakistan Agricultural Research Council
PBS	Pakistan Bureau of Statistics
PDMA	Provincial Disaster Management Authority
PKR	Pakistani Rupee
PPP	Purchasing Power Parity
PRISE	Pathways for Resilience in Semi-arid Economies
SDPI	Sustainable Development Policy Institute
SPPs	Social Protection Programmes
UIB	Upper Indus Basin
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USD	United States Dollar
WB	The World Bank

Executive summary
Climate change is likely to affect human mobility patterns, particularly, in resource-dependent rural areas where livelihoods and economic activities are climate-sensitive. This is especially true for a country like Pakistan which has a large rural population dependent on agriculture, livestock and forestry for its livelihoods. Over the past decades, changing rainfall patterns and temperature fluctuations across the country have increased difficulties for those engaged in agriculture and other sources of rural livelihoods. Poverty, food insecurity, low human development, poor governance and inadequate access to health and education services have exacerbated rural vulnerability which has led to the need for rural livelihood diversification. As a consequence, a proportion of the rural population has adapted by shifting livelihoods away from the agriculture sector, and in some cases, moving to urban areas altogether. While there are limited studies in Pakistan on the phenomenon of rural-to-urban migration in response to climate change, this synthesis paper is an attempt at filling the literature gap on migration as an adaptation strategy in rural communities vulnerable to climatic impacts and risks.

By converging Pakistan-specific findings of two research consortia – Pathways for Resilience in Semi-arid Economies (PRISE) and Himalayan Adaptation, Water and Resilience Research (HI-AWARE) – this synthesis explores the linkages between migration and climate change in order to understand how migration contributes to adaptation at the household level. Evidence is collected from two socio-ecologically diverse regions of Pakistan which were the focus of each multi-country research consortium: the semi-arid plains and the Upper Indus Basin (UIB). Case studies were used to collect evidence from rural areas of eight districts in Punjab, Khyber Pakhtunkhwa (KPK), and Gilgit-Baltistan (GB). Based on the research evidence gathered (Salik et al. 2017; Qaisrani et al. 2017), this study considers how climate change is impacting rural livelihoods, and what adaptive measures households are adopting to reduce livelihood vulnerability to climate risks. Drivers of migration in these communities are also analysed to better understand the channels through which climatic (and non-climatic) factors affect migration. Finally, the research explores whether rural out-migration is indeed an adaptation response to climate and environmental change.

The results of the PRISE and HI-AWARE studies show that rural populations are increasingly perceptive of the risks climate change poses to incomes and livelihoods. Respondents reported observing changes in climate conditions over time such as shifts in temperature, precipitation patterns and frequency of climate extreme events. Reported livelihood vulnerabilities associated with climate change included, among others, a decline in crop yield, periodic crop failure, degradation of pasturelands, water contamination, and spread of heat-related water borne diseases. To adapt to such changes, communities shared undertaking a number of adaptive measures which varied regionally.

In PRISE sites,[1] farmers were adapting to slow-onset climate change by investing in farm inputs, mechanisation of farmlands, and crop diversification. In HI-AWARE sites, they introduced new crop varieties, changed cropping cycle and patterns, and improved harvesting systems to adapt to environmental changes. In some cases, rural households in both areas adapted by shifting livelihoods to non-farm activities, and in some cases, shifting away from rural areas altogether. From the analysis of the two studies, migration seemed to be a common household strategy to cope with shocks and stresses. Depending on the regional and household differences, 20-50% households reported recently sponsoring and supporting migration of at least one household member. However, socioeconomic factors were a key determinant of migration outcomes. Better wages, work opportunities, living standards, access to education and health facilities in urban areas were key factors driving rural-to-urban migration. Food insecurity, underdevelopment, imperfect landownership rights and tenure systems in rural settlements also appeared to be compelling many to out-migrate to urban areas. Environmental and climatic factors, such declining crop productivity, increased economic incentives for rural out-migration.

[1] Given their similar geographical locale, the two study areas are referred to as PRISE and HI-AWARE study sites, instead of semi-arid and/or Upper Indus Basin.

Coincidently, areas with higher number of migrant households were also prone to climate hazards. As a result, a significant proportion of respondents had been displaced in the past, incurring human and monetary losses. During such duress, migrant remittances worked as a cushion against food insecurity, floods, and heat waves etc. Where migration occurred, it was both costly and entailed hardships. Nevertheless, the appeal of additional household income in the form of migrant remittances persuaded many to sponsor migration of a household member. This faith in migrant remittances was not without merit since they did contribute to uplifting the socioeconomic status of migrant households by increasing and diversifying income streams. However, not all household members benefitted equally from migration, as rural out-migration was male-dominated. Women were not only excluded from opportunities for labour migration, they also had to assume additional household responsibilities when male household members out-migrated. Based on the synthesis results, the following policy recommendations are proposed:

1. **Developing a national policy on internal migration.**

There is need for a national policy in Pakistan which can regularise internal mobility and labour migration, with a focus on rural-to-urban migration. Such a policy should be well-integrated into climate change adaptation policies and action plans, as well with relevant sectoral policies and public sector programmes. It should be complemented by investment in research, data collection and capacity building to improve understanding of the migration-climate nexus.

2. **Monitoring and regulating labour market supply-demand gaps.**

Labour market wage differentials are a primary driver of rural-to-urban migration, therefore, a mechanism needs to be developed that can monitor and regulate labour market supply-demand gaps, such as the dearth of labour in a particular urban setting, and its surplus in a rural market. Such a mechanism can help regulate labour mobility in internal migration hotspots (such as the UIB) by 'match-making' demand and supply of labour (skills and needs).

3. **Promoting rural livelihood diversification.**

There is a need to promote rural livelihood diversification through extensive programmes focusing on the rural workforce that is increasingly shifting away from agriculture, and is in search of alternative livelihoods. For such populations, there is a need to introduce technical and vocational training programmes, with a particular focus on rural women.

4. **Strengthening social safety programmes, access to health/education services, and investments in climate-resilient infrastructure.**

The underlying causes of rural vulnerability need to be rooted out by strengthening social safety programmes that target poverty reduction, boost food security, and social equality in rural areas, with a particular focus on vulnerable groups, such as women. There is also a need for improvements in access to health and education services, in addition to investments in climate-resilient infrastructure.

5. **Improving rural fiscal resilience.**

Rural areas need to be provided institutional support for improved fiscal resilience. Migrant households could be given advisory support, for example, about where to invest their remittances in a way that can enhance both resilience and livelihoods. Efforts should be made to improve access to formal channels of credit to rural communities, especially small and subsistence farmers, because such access is critical for rural households in adapting to climate change and coping during climate disasters and duress.

6. **Enhancing service and delivery of agricultural extension programmes.**

Rural support for climate adaptation should also aim to improve service and delivery of rural agricultural extension programmes. The Government should start initiatives that support small farmers' market linkages, access to credit, technology, and livelihood-relevant climate knowledge.

Section I: Introduction

Over the past three decades, there has been increasing research on anthropogenic climate change and its impacts on human societies. Climatic variability and change are expected to affect human and natural systems in the future as they have done so in the past (Adger et al. 2009; Adger et al. 2003). However, cross-regional and cross-scalar inquiries suggest that the frequency, intensity, and variability of climate-related events is increasing, and the consequent effects would, therefore, also be more severe (IPCC 2014). In rural areas, where livelihoods and economic activities are climate-sensitive, these impacts are more pronounced, ranging from seasonal or sporadic disruption of agricultural activities to the physical displacement of entire communities. However, between minor manageable disruptions, and rendering habitats uninhabitable, there lies a spectrum of impacts that communities are constantly negotiating with and adapting to. These adaptations can be 'autonomous'[2] or 'planned'.[3]

One of the more common 'autonomous' strategies for adapting to climate change is out-migration from vulnerable rural areas into urban or peri-urban areas. This, in many ways, is both a direct adaptation action as it minimises physical exposure, and is also a gateway to other strategies for building resilience such as diversifying sources of income and getting access to more information (Geddes and Jordan 2012; Black et al. 2011a). However, the relationship between climate change and migration is not linear (McLeman and Smit 2006; Mueller et al. 2014), and is dependent on a multitude of causation factors (Black and Sward 2009; Black et al. 2011b; Barnett and Adger 2007; Banerjee et al. 2011). Observed, experienced and anticipated changes in climate patterns influence the decision to migrate in conjunction with economic, socio-cultural, and political factors that are embedded within human contexts (Black et al. 2011b; Brown 2008).

Scientific studies on the migration-climate nexus indicate that climatic and environmental variables affect migration outcomes through slow-onset changes (such as sea-level rise, global temperature rise, desertification and salinization of agricultural land, etc.), and sudden climatic events (such as floods, cyclones, droughts, and heat waves) (Otto et al. 2017). As communities and households are exposed to such slow-onset or sudden climatic events and associated risks, they respond by adjusting or adapting so as to avoid or overcome negative outcomes and vulnerabilities (Barnett and Chamberlain 2010).[4] In this light, migration may be seen as one out of a set of potential responses by households for adaptation (McLeman and Hunter 2010).

Generally speaking, migration as an adaptation strategy brings benefits for the migrants as well as the migrant-sending households and communities. It enhances living standards in migrant-sending areas through the inflow of remittances, expansion of migratory networks, and improvements in human capital (health, education, skills, and knowledge). Transfer and diffusion of knowledge and skills contribute to the anticipatory capacity of households (Qaisrani et al. 2017), whereas expansion of social networks can be a buffer during climate disasters and stresses (Barnett and Chamberlain 2010). Migrants, in this sense, can be seen as agents of change that can help build resilience in migrant-sending communities (Salik et al. 2017).

It has also been found that communities which receive migrants stand to benefit from the influx of labour, increase in diversity and economic activity. However, this is contentious as this influx can also increase competition for jobs, put a burden on shared resources and utilities, and create or reinforce identity-driven conflict. Even in the case of migrants and their communities of origin, there are some limitations that need to be considered, e.g., factors that limit the ability to migrate, such as poverty, gender, and disabilities. These pros and cons preclude the possibility of unequivocal and definitive answers to whether migration is an adaptive strategy for communities vulnerable to climate change;

[2] Adaptation which does not constitute a conscious response to climatic stimuli, but is triggered by ecological changes in natural systems and by the market or *welfare* changes in human systems.

[3] Adaptation which is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state.

[4] Adaptation to climate change is increasingly defined by a number of terms with varying meanings, such as adaptive capacity, vulnerability, exposure, sensitivity, and resilience (Porter and Davoudi 2012). The IPCC defines adaptation as 'the process of adjustment [in human and natural systems] to actual or expected climate and its effects… that seeks to moderate or avoid harm or exploit beneficial opportunities' (IPCC 2014, Annex II:118). In other words, adaptation to climate change implies that people adopt a response that seeks to adjust to, or avoid, undesirable circumstances or outcomes so that they are not worse off than they started (Barnett and Chamberlain 2010).

and, what are its key drivers and determinants, without first undertaking a structured investigation of areas that are vulnerable to climate change.

Two research consortia – HI-AWARE and PRISE – undertook structured investigations on the above issues. This synthesis paper analyses the findings of the studies to understand the linkages between migration and climate change, and through this understanding, answer how migration contributes to adaptation at the household level in rural communities vulnerable to climatic impacts and risks.

The theoretical background of this synthesis work is rooted in the New Economics of Labour Migration (NELM) school of thought. It places central importance on the household as a decision-making unit that engages in migration as a risk-sharing strategy to maximise and diversify income, minimise and spread risk, and overcome market constraints (De Haas 2010).

> Migration is a means to secure and improve livelihoods, and promote investments so as to acquire a broad range of assets that can insure against future shocks. It is, thus, seen as an enabling strategy for households to become resilient to climate change by minimising risks to incomes, diversifying livelihoods, buffering against shocks, and improving socioeconomic indicators such as poverty, food security, education and health (De Haas 2010).

Using evidence collected from socio-ecologically diverse regions of Pakistan, case studies are introduced from rural areas of eight districts in Punjab, Khyber Pakhtunkhwa (KPK), and Gilgit-Baltistan (GB). Based on these, the study considers the livelihood vulnerabilities faced by rural communities and the coping/adaptive strategies that households adopt to reduce vulnerability to risks. Drivers of migration in these communities are also analysed to better understand the channels through which climatic (and non-climatic) factors affect migration. Confirming the affirmative role of migration in building adaptive capacities and household resilience, the review concludes by summarising lessons learned and proposing key policy recommendations that aim to support migration as an effective adaptation strategy against external shocks in national and sub-national policy circles.

Section II: Research context

The following section provides an overview of climate and development trends across Pakistan. Locally available data specific to the study sites is limited and sparse. Hence, regional trends have been summarised where data is available on semi-arid plains and UIB, along with a review of national trends.

Pakistan is a lower middle income country with a population of about 208 million people[5] (PBS 2017; The World Bank 2018). The services sector is a major contributor to the national Gross Domestic Product (GDP), followed by industries and the agricultural sector. Presently, agriculture contributes about 19.5% to the national GDP, and employs 43.4% of the total population (GoP 2017). Over the past few decades, the agriculture sector's role in the economy has gradually declined, as has its employment share, yet a large proportion of the rural population (which makes up 64% of the total population) is still engaged in this sector (PBS 2017).

Table 1: Pakistan's performance in major development indicators

Development Indicator	2016
GDP	USD 283.7 billion
GDP per capita	USD 1,468
Total population	207.8 million (2017)
Rural population (% of total)	63.6% (or 132.2 million) (2017)
Employment in agriculture (% of total employment)	43.5%
Total unemployment rate (of total labour force)	5.4%
Human Development Index (HDI)	0.538 (Ranks 147th)
Population in Multidimensional Poverty	45.6% of total
Working poor at PPP USD 3.1/day	37.1% of total employed
Global Hunger Index (GHI 2015)	33.9 (serious)

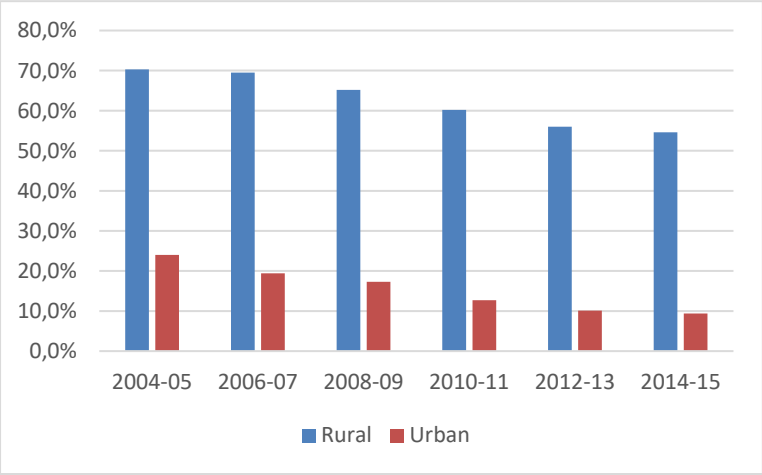
Sources: Various UNDP, WB, FAO 2015-17 documents.

Pakistan's climate is predominantly arid to semi-arid. In the upper to middle reaches of the country, the climate varies from arid, semi-arid and temperate sub-humid, to alpine in the mountainous areas of the north (FAO and Aquastat 2011). Average annual precipitation varies greatly between 100-500mm in arid to semi-arid zones, to 2000mm on highlands (Ibid.). Generally, precipitation is low and erratic in the Upper and Middle Indus Basin with frequent extreme events. In the plains, rainfalls occur during the monsoon season (July-September). Flooding is, thus, a common and recurring problem along the floodplains of the Indus Basin during the monsoon. This has a dramatic impact on agriculture, livestock, water and other key sectors of the economy.

Over the past decades, changing rainfall patterns and temperature fluctuations have increased difficulties for those engaged in agriculture and rural livelihoods – particularly subsistence farmers and the landless. As a result, food insecurity and poverty are major rural issues in Upper and Middle Indus Basin, the underlying causes of which are rooted in the heavy livelihood dependency on natural resource-based sectors, such as agriculture, livestock and forestry. Rural peoples' vulnerability is further exacerbated due to high multidimensional poverty (see Fig. 1), low human development, environmental, and service delivery standards. Poor governance and low penetration of Social Protection Programmes (SPPs) further intensify vulnerabilities, and create incentives for rural livelihood diversification.

[5] Based on the provisional results of the 6th Population and Housing Census of Pakistan 2017. The provisional results do not include the population of Gilgit-Baltistan (GB) and Azad Jammu and Kashmir (AJK).

Figure 1: Rural-urban multidimensional poverty in Pakistan



Therefore, it is no surprise that a proportion of the rural population has been adapting by shifting livelihoods away from the agriculture sector, and in some cases, moving to urban areas altogether. While there are limited studies in Pakistan on the phenomenon of rural-to-urban migration as an adaptation response to climate change, this synthesis paper is an attempt at filling this literature gap.

Source: GoP and UNDP (2016).

Past observed changes in various meteorological parameters over Pakistan indicate that the climate is gradually changing. Over the last century, the average annual temperature has risen by 0.6°C, and annual precipitation has increased by 25% (Sheikh et al. 2009). Most of the warming trend over the country has been due to a rise in winter temperature, but the central parts of Pakistan have also seen a significant rise in minimum summer temperatures (ADB 2017). A study published in *Nature* by Treydte et al. (2006) concluded that the 20th century was the wettest in a millennium in the area now constituting northern Pakistan, and most of the precipitation coincided with the period of industrialisation and global warming (i.e., late 1800s onwards). In the monsoon belt, summer rainfall increased by 18-32% during 1901-2000, whereas northern areas outside the monsoon belt experienced expanding aridity during the same period (ADB 2017). Other areas, such as the northern mountains, have experienced a decline in summer rainfall in recent decades (Hussain et al. 2005; Fowler and Archer 2006), along with a trend of warming in winter (Khattak et al. 2011; Fowler and Archer 2006), and cooling in summer (Fowler and Archer 2006). Across the country, heat wave days per annum increased by 31 days during 1980-2007 (ADB 2017).

Consistent with past trends, future climate projections show that annual mean temperature is expected to continue rising by 2-3°C, which is higher than the projected global average (Saeed et al. 2016; GoP and UNEP 2013). The northern parts of the country are expected to experience higher temperature rise by 2080 as compared to the southern areas (Ibid.). The mean annual precipitation in both northern and southern Pakistan is forecasted to increase in summer, and decrease in winter with no significant change in average annual rainfall (Islam et al. 2009). The occurrence of hot days and hot nights is expected to significantly increase (ADB 2017). With such changes, there is also an increased likelihood of occurrence of extreme climatic events (like heat waves, floods, Glacial Lake Outburst Floods [GLOFs], droughts, etc.) as has happened in the past.

As climatic patterns continue to change, their consequences will be felt on critical sectors such as water, agriculture, demography, and natural resources (Pachauri and Reisinger 2007 in Qaisrani and

Salik 2018). These impacts will be felt by rural communities given their heavy reliance on natural capital-based livelihoods (IPCC 2014). Generally, rural areas are expected to experience shifts in water and food security, agricultural incomes and changes in productive lands (Ibid.). They may, thus, experience rise in environmental risks associated with rural incomes, a decline in livelihood opportunities, and greater stress on social institutions (Agrawal 2008). Rural communities in mountainous regions are exceptionally vulnerable given the higher exposure to natural hazards such as flash floods, landslides, GLOFs, etc., and their increased sensitivity due to lack of adequate services and development work (IPCC 2014; IPCC 2013; Messerli et al. 2004). Development interventions in mountainous regions are subject to unique logistical challenges due to the terrain and topography. This limitation also affects attempts to scale up or expand adaptation solutions.

Extreme climatic events over the past decade in northern and central regions of Pakistan have exposed them to external shocks that have resulted in human disasters with serious socioeconomic consequences. For example, during the 2015 floods, more than 100,000 rural residents in Dera Ghazi Khan (D.G. Khan) were displaced, while almost 500,000 acres of land surrounding 453 villages was destroyed (The Express Tribune 2015). Similarly, the 2010 Lake Attabad landslide, that blocked Hunza River following a massive snowstorm in mountainous region of GB permanently, displaced more than 17,000 rural residents as their villages were submerged in the newly created lake (Ebrahim 2010).

Table 2: Damage from floods in Pakistan (2010-17)

Year	No. of affectees	No. of deaths	Villages affected	Area affected	Direct economic losses (USD)
2010	20 million	2,000+	17,553	20% of total land area submerged underwater	10 billion
2011	9.2 million	500+	38,700	2.2 million acre crop area in Sindh and Balochistan	3.7 billion
2012	4.85 million	571	14,159	1.17 million acre crop area	2.6 billion
2013	1.5 million	333	8,297	1.11 million acre crop area	2 billion
2014	2.6 million	367	4,065	2.42 million acre crop area	0.5 billion
2015	1.9 million	238	4634	0.7 million acre land	170 million
2016	NA	424	45+	4381 houses damaged	6 million+
2017	NA	164	NA	440 houses damaged	NA

Source: Various versions of NDMA and FFC annual reports, GoP.
Note: NA – Not available.

The environmental vulnerabilities that communities face in these regions are aggravated by the socio-political and economic vulnerabilities that further erode their adaptive capacities. Among other developmental deficits, the UIB and semi-arid plains face similar challenges of food insecurity, poverty, inadequate public amenities and limited employment opportunities in rural areas. To reduce their exposure to economic and environmental risks, a number of rural households within these regions adapt by sending a member of the household to urban centres to add to household incomes (Saeed et al. 2016). Migration is, in fact, a common household strategy in the mountainous region of UIB (Milan et al. 2015; Gioli et al. 2014) and semi-arid areas of Punjab and KPK (Salik et al. 2017). According to some estimates, rural-to-urban migration constitutes up to 40% of internal migration in Pakistan (Arif 2005).

Studies investigating the migration-climate nexus conclude that there is indeed a fine correlation between climatic variables (such as heat and water stress), and migration decisions in rural areas (Qaisrani et al. 2017; Saeed et al. 2016; Mueller et al. 2014; Sattar 2013). Migration is used as a strategy not just to adapt households to climate shocks, but also to adjust and adapt to non-climatic

stresses, such as economic and socio-political duress (Salik et al. 2017; Gioli et al. 2014; Ishaq, Ahmed and Saeed, unpublished). Through migration, rural households diversify their income, improve human capital and socioeconomic status. Thus, migration indirectly plays a role in not just increasing adaptation and resilience of households, but also improving development outcomes, such as through poverty alleviation (Irfan 2011).

Despite the positive trend of rural-to-urban migration across Pakistan, the issue of migration (and migration-climate nexus) receives limited governmental support or recognition in national policy circles (Ishfaq et al. 2017). Existing policy discourse on migration is limited to international migration. The National Emigration Policy (2013) is one such example. Through increased regularisation and facilitation, the policy seeks to tap into the benefits that accrue from overseas emigration. However, it does not propose measures to reap into the direct and indirect benefits that local communities enjoy as a result of internal migration (much of which is rural-to-urban). The financial gains (of internal migration) to sending communities are often unaccounted in official documents, because of which their role in the national economy is overlooked.

Moreover, migration links are disconnected from both development and climate change adaptation policies and plans. For instance, the National Climate Change Policy (NCCP) is mostly silent on rural-to-urban migration, but where it does speak, it proposes measures to 'curb', 'check' or 'discourage' it (GoP 2013: 77; GoP 2012: 26). Additionally, there is limited government intervention in providing formal corridors for adaptation support, even as local communities adapt their lives and livelihoods to changes in the local environment. Government support is visible in areas previously hard-hit by climatic disasters (such as D.G. Khan that was devastated by recurrent floods of 2010, 2012, 2013 and 2015). However, overall support in other vulnerable areas is missing, despite the existence of an overarching policy framework for adaptation, such as the NCCP, Framework for Implementation of NCCP, Sustainable Development Goals (SDGs), etc.).

It is important to learn from other developing countries that face climate vulnerabilities, like Bangladesh and Ethiopia, who have officially embraced migration as an adaptation response to climate change in their National Adaptation Plans of Action (Banerjee et al. 2011). Based on the expanding research evidence on rural migration as an enabling adaptation strategy, the government needs to harmonise existing policies and plans based on the migration-climate nexus, as well as transform relevant policy pledges into concrete actions, especially considering that migration as a livelihood diversification and adaptation strategy is a prominent rural trend.

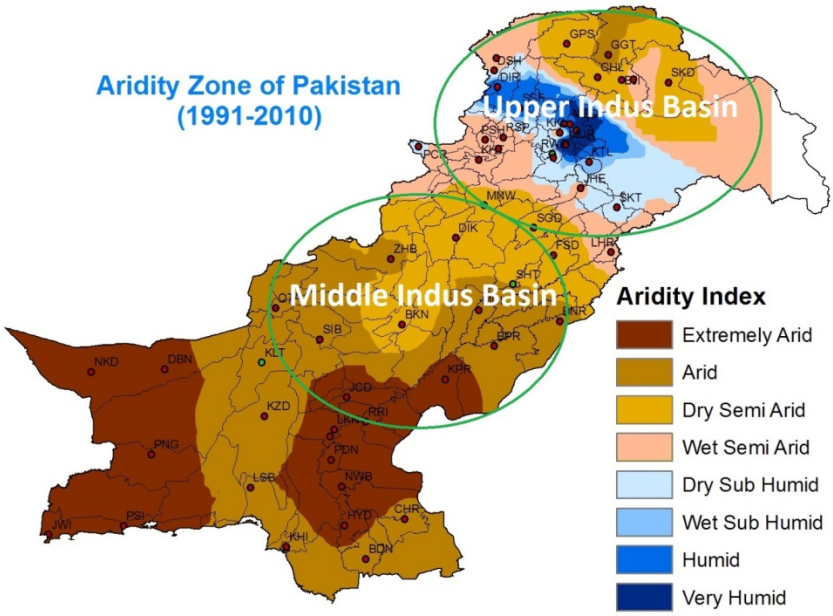
2.1. Research methodology

This paper synthesises research findings of two independent studies carried out in Pakistan under the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) programme. The Pathways to Resilience in Semi-arid Economies (PRISE) project was focused on semi-arid plains, which was led by the Sustainable Development Policy Institute (SDPI) in Pakistan. The Himalayan Adaptation, Water and Resilience (HI-AWARE) project carried out research in Pakistan on the UIB, which was led by Climate Change, Alternative Energy, and Water Resources Institute of the Pakistan Agricultural Research Council (CAEWRI-PARC) and Leadership for Environment and Development (LEAD) Pakistan.

Specific rural sites were selected within eight districts. PRISE case studies were carried out in rural areas of Faisalabad and D.G Khan in Punjab, and Mardan in Khyber Pakhtunkhwa (KPK). For HI-AWARE, rural areas of Hunza and Nagar in GB, and Sargodha, Rawalpindi and Chakwal in rural Punjab were selected.

Geographically speaking, both semi-arid areas and UIB refer to the same geographical locale, with the exception of a few regions. Parts of semi-arid areas lie in the UIB, but not the entire Basin is semi-arid, particularly the alpine and mountainous terrains. Moreover, some of the study sites lie in Middle Indus Basin (such as D.G. Khan and Sargodha). Thus, this synthesis work refers to the two study areas as PRISE and HI-AWARE study sites, instead of semi-arid and/or UIB.

Figure 2: Aridity map of Pakistan showing Upper and Middle Indus Basins
(based on PMD Station data from 1990 – 2010)[6]



Source: Pakistan Meteorological Department (2000), courtesy of Dr Bashir Ahmed, Climate Change and Geo-Informatics Programme Leader, CAEWRI-PARC.

The research sites are predominantly rural, and were selected based on a three-point criterion:

(i) exposure to climatic/environmental hazards and extreme events in recent years;
(ii) stakeholder identification/recommendation;
(iii) presence of local partners to aid in site access, identification and research facilitation.

The data was collected in 2016 and 2017. The sample size for the PRISE study was 600 households, whereas the sample population for the HI-AWARE study was 419 households. Based on their responses to questions about migration status, respondent households were categorised into migrant, and non-migrant households by the research teams. A migrant household was defined as a rural household that had at least one member who had recently out-migrated internally or internationally.[7] Generally speaking, perspectives of migrant households excluded viewpoints of migrants themselves as they were not present at the time of the survey.[8] Non-migrant households were those that did not have any migrant member.

A mix of Key Informant Interviews (KIIs), gender-disaggregated Focus Group Discussions (FGDs), and household questionnaires were used to collect quantitative and qualitative data. The research questionnaires differed for both projects' study sites, as they were drafted and collected by different project teams lead by SDPI for PRISE and CAEWRI-PARC for HI-AWARE.[9] However, common research themes and data were consolidated after fieldwork and migration-related research findings were synthesised for the Upper and Middle Indus Basin, upstream of Sindh and Balochistan provinces in Pakistan.

[6] Upper and Middle Indus Basins are arbitrarily defined by the authors, based on geological maps.
[7] For PRISE, migrant households were those who had a household member who had out-migrated in the last three months, whereas for HI-AWARE, migrant households were those whose migrant member had out-migrated for at least three months in the past one year.
[8] While it would have been ideal to capture perspectives of the migrants and their host communities, the time, scope and cost constraints made this a research limitation. This study also excludes viewpoints of migrant households in which all members of the household out-migrated.
[9] Given the large sample size, and field survey limitations, some parts of the sample were missing or not collected, and were omitted from analysis of the data sets.

The results section of this synthesis draws from datasets of both PRISE and HI-AWARE. For findings related to PRISE research, the next section also draws from two earlier publications by PRISE-SDPI: i.e., Salik et al, (2017), and Qaisrani et al. (2017).

2.2. Strengths and limitations of the analysis

The purpose of this synthesis is to highlight the role of migration in the adaptation context under different climatic and agro-ecological zones. However, drawing a true parallel between the two research studies is not possible because of the differences in research goals and objectives, scope, and research methodology, including differences in data collection, sample size, research questions and questionnaires. Even the definition of migration was different for the two project teams. However, there were many commonalities on the basis of which similar trends were drawn. Based on the data available, this synthesis offers insights on determinants of migration, followed by an analysis and discussion of how migration contributes to rural adaptation to climate change under different regional contexts.

Section III: Key synthesis findings

This section briefly explores rural communities' observation of environmental changes and their implications for rural livelihoods, followed by a synopsis of contemporary adaptation practises used by rural communities to overcome livelihood vulnerability to external risks and shocks. With a brief reference to drivers of migratory movement within national borders, a discussion follows on migration as an enabling adaptation strategy.[10]

3.1. Climatic change and livelihood vulnerability[11]

Given their primary dependence on agriculture, livestock and forestry sectors, rural economies in Upper to Middle Indus Basin areas are increasingly vulnerable to climate change. This research finds that farmers are cognizant of the changes in the environment and climate that indirectly and directly affect rural livelihoods. Despite limited access to scientific knowledge, rural households surveyed by PRISE teams in semi-arid plains noted a gradual:

(i) decrease in rainfall,
(ii) rise in temperatures, and,
(iii) change in the number of hot and cold days during winter and summer seasons.

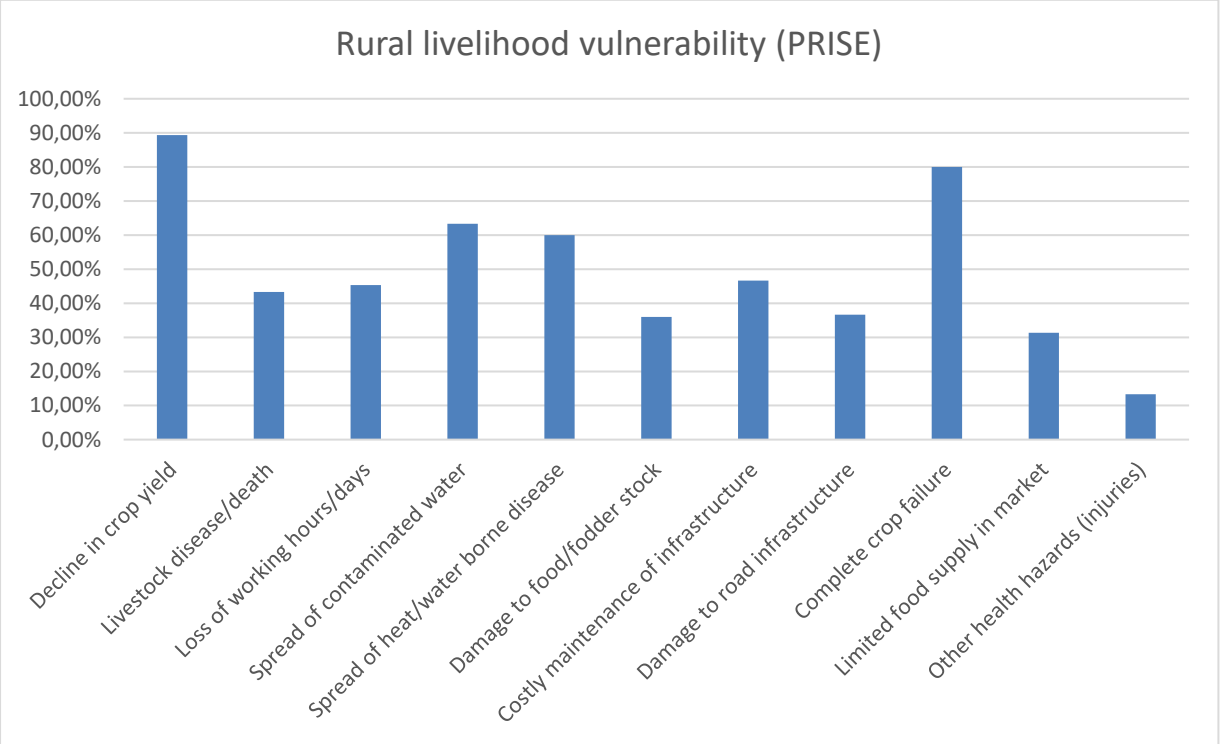
Rural communities surveyed under HI-AWARE reported:

(i) a rise in erratic rainfall,
(ii) decrease in winter precipitation, and,
(iii) increase in frequency of flash floods.

Interestingly, migrant households in both PRISE and HI-AWARE sites were more perceptive of these changes compared to non-migrant households, making them more likely to timely respond to such changes in an effective manner. Similar to the semi-arid areas studied under PRISE, the UIB areas under HI-AWARE are predominantly agriculture dependent, with the upstream areas of Hunza and Nagar also relying on forestry. Farming households surveyed under HI-AWARE perceived environmental and climatic change in terms of their impacts on rural livelihoods. For example, farmers reported a change in environmental conditions, by giving evidence of the rise in pest and weed attacks, degradation of pasture lands and decrease in crop yields. Rural households surveyed under PRISE reported similar livelihood vulnerabilities, that included complete crop failure (especially for D.G. Khan that has been affected by recurrent floods), decline in crop yields, spread of contaminated water, and heat-related and water-borne diseases that affected the number of work days spent on farm/ rural employment.

[10] When addressing questions related to long-term migration, the study does not distinguish between temporary migration (lasting ten years, for example) and permanent migration (lasting a lifetime).
[11] HI-AWARE results in this section are based upon data from upstream areas only since at the time of writing this paper, data on mid- and downstream UIB sites was not accessible.

Figure 3: Livelihood vulnerability reported by PRISE farmers due to climate change



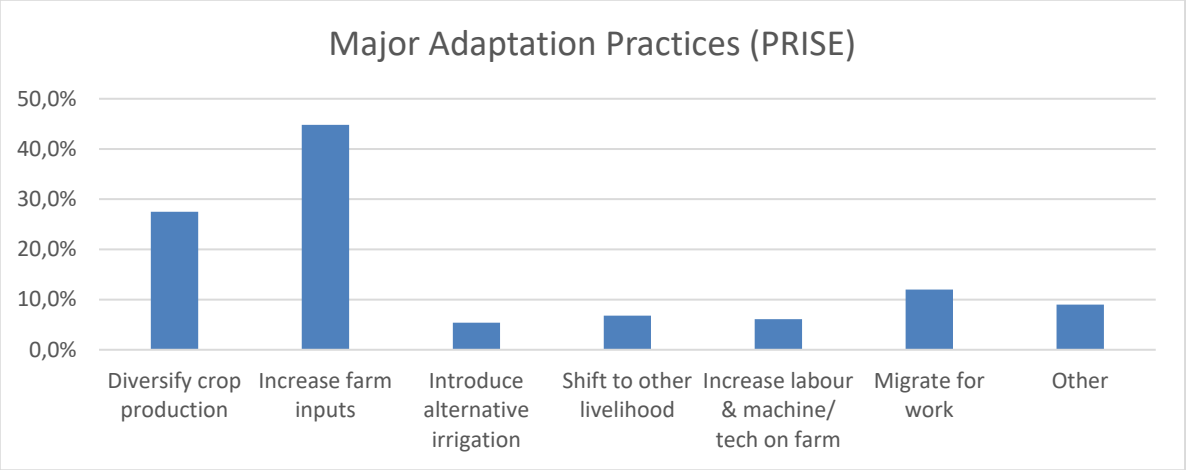
Source: Authors' own.

3.2. Adaptive measures to reduce livelihood vulnerability to climatic risks

The study sites were primarily reliant on natural resource-based sectors. Hence, the focus was on understanding how farmers were adapting their resource-dependent livelihoods to shocks and stresses (particularly climate change). To overcome vulnerabilities and risks posed to rural livelihoods, households reported a number of adaptive measures that they took against climatic and non-climatic risks. These are shown in Figures 4 and 5.

To deal with slow-onset climate change, farmers surveyed under PRISE commonly resorted to intensifying farm inputs (45%), such as fertilisers and pesticides to increase farm incomes. They also reported diversifying crop varieties (27%). The third most common adaptation strategy against climate change was to encourage and support migration of at least one member of the household. It is important to note here that given the highly patriarchal culture dominant in rural areas, it was usually always a male family member who was encouraged and supported to migrate. Only in the case of Faisalabad did villagers report supporting female household members to migrate to urban areas (4% of households). Other adaptation techniques that farmers generally employed in PRISE study sites were the increased mechanisation of agriculture through use of (more) machines and labour (6%); improved on-farm water infrastructure (5%); and in some cases a shift away from agriculture as a primary source of livelihood (7%).

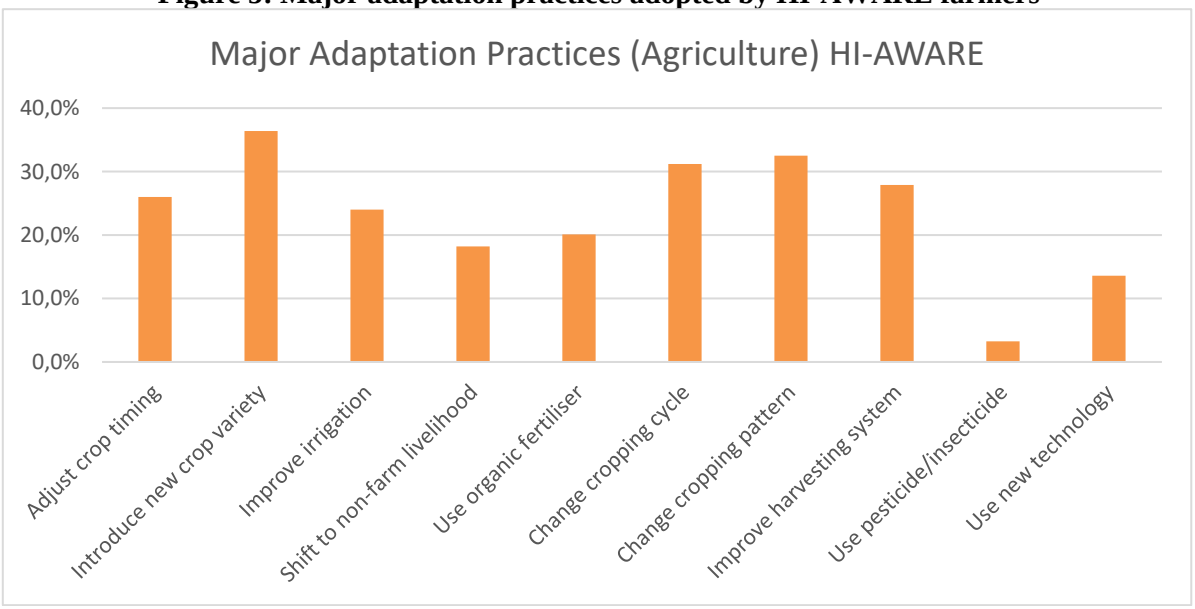
Figure 4: Major adaptation practices adopted by PRISE farmers



Source: Authors' own.

In areas surveyed by HI-AWARE, the agricultural adaptation strategies most frequently used by households were the introduction of new crop varieties (36%), followed by changes in cropping cycle and pattern (32%); improvements in harvesting systems (28%); and improvements in irrigation system (24%). Almost a fifth (18.2%) of the farmers engaged in agriculture reported shifting away to non-farm livelihood activities. Some households adopted up to seven adaptation practices at a time. Figure 5 highlights the type of adaptation measures taken at the household level:

Figure 5: Major adaptation practices adopted by HI-AWARE farmers



Source: Authors' own.

Farmers in HI-AWARE sites complemented adaptation measures in agriculture by undertaking practices in the forestry, livestock and water sectors. In the livestock sector, these included improvements in animal shed/ponds (56%), investments to counter pests and disease (48%), and a shift away to non-farm activities (35.4%). Of those engaged in the water and forestry sectors, major adaptation practices were rehabilitation of degraded lands (55%) and investments in maintenance and protection of water sources (56%).

Interestingly, some households in both regions (between 6-14%) reported that they did not adapt to climate change impacts. It seems that a majority of those who did not, either did not have the know-

how and information on how to adapt, or did not have the means or resources to adapt their economic activities, given the reportedly high cost of adaptation.

3.3. Public and private adaptation support schemes

Reported government support provided in semi-arid plains under PRISE varied from provision of subsidies, credit, and/or insurance and new seed varieties, to early warning systems and capacity building programmes. Respondents in Punjab (D.G. Khan and Faisalabad) reported receiving some level of government support, whereas respondents in KPK (Mardan) recounted that there was no known government-provided adaptation facility/programme. Even though the local public departments countered this claim, it goes to show the lack of penetration of public schemes in some areas.

Access to insurance schemes and/or 'external support' was reported in HI-AWARE study areas of UIB. Even though many households were beneficiaries of life and health insurance, it cannot be assumed as a proxy for government support or expansion of public financial infrastructure. A few households also owned livestock insurance, which included coverage in case livestock was hunted by predators (such as the snow leopard in uplands of Hunza and Nagar).

3.4. Drivers and determinants of migration

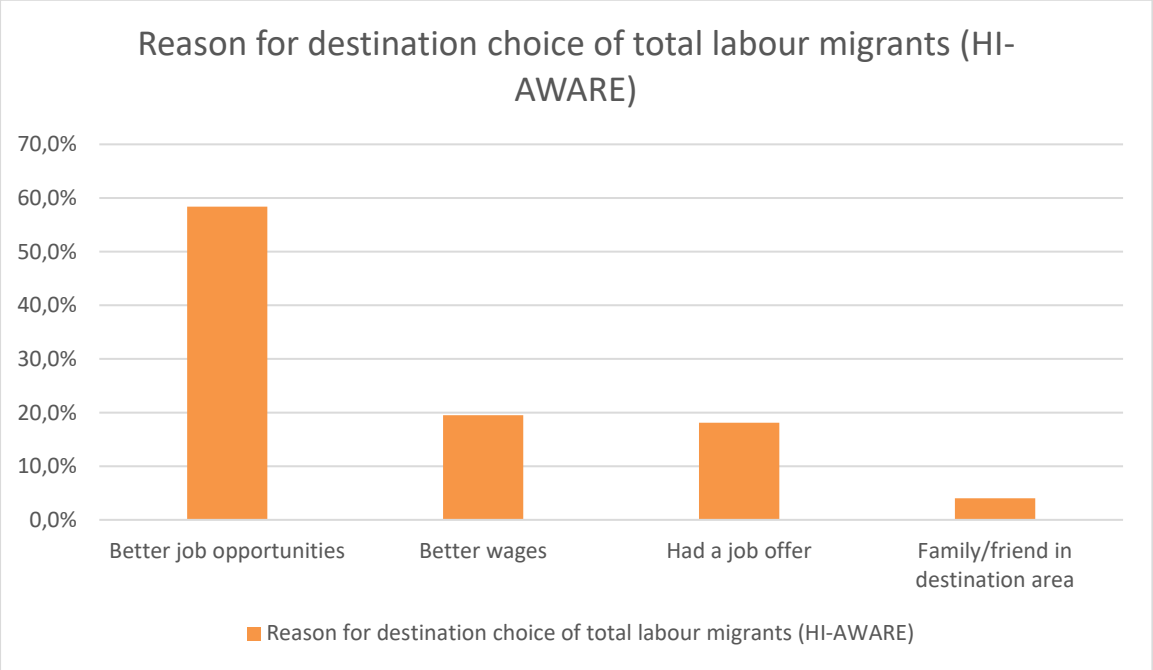
To help understand the role of migration in household adaptation and resilience-building, this review has tried to delineate the underlying causation factors that affect migratory outcomes in upper and middle areas of Pakistan. For ease of understanding, drivers of migration that generally cut across spatial and temporal dimensions are classified into economic, political, social and environmental spheres (UN n.d.; Geddes and Jordan 2012; Black et al. 2011a&b).

Consistent with national and international literature, migratory decisions were shown to be an outcome of a complex interplay of causation factors (Mazumdar 1987; Etzo 2008; Kolev 2013) in both PRISE and HI-AWARE study sites.[12] These are presented in Figures 6a, 6b and 7.

Internal migration in PRISE study sites was shown to be predominantly driven by **economic factors** that were rooted in both places of origin and destination. These included aspects such as better employment prospects in urban centres (81%); inadequate job opportunities in rural settings (71%); and dissatisfaction with present rural livelihoods (45%). Wage differential between urban and rural labour markets, better opportunities for income diversification and small-business investment in urban centres also seemed to be persuasive factors for migratory decisions (Salik et al. 2017). Similarly, most migrants within HI-AWARE study areas migrated for a combination of reasons, but the most commonly cited factors related to employment opportunities (48%). More importantly, 57% of migrant households reported that the migrant was gainfully employed in full-time work at the time of migration. If those that were self-employed or employed as part-time workers are included, the proportion increases to 81%. This suggests that there was discontentment with the existing means of rural income as compared to opportunities for employment in the destination area. This differential, which is also witnessed in semi-arid areas, served as a driver for out-migration.

[12] Respondents in both studies selected multiple reasons. Therefore, those that stated one reason for migration did not do so exclusively. The respondents were not migrants themselves, but members of their households (in places of origin). Hence, the responses capture perceptions about drivers and determinants of migration from the perspectives of migrant households.

Figure 6a: Reasons for rural out-migration as reported by HI-AWARE respondents



Source: Authors' own.

Figure 6b: Reasons for rural out-migration as reported by HI-AWARE respondents

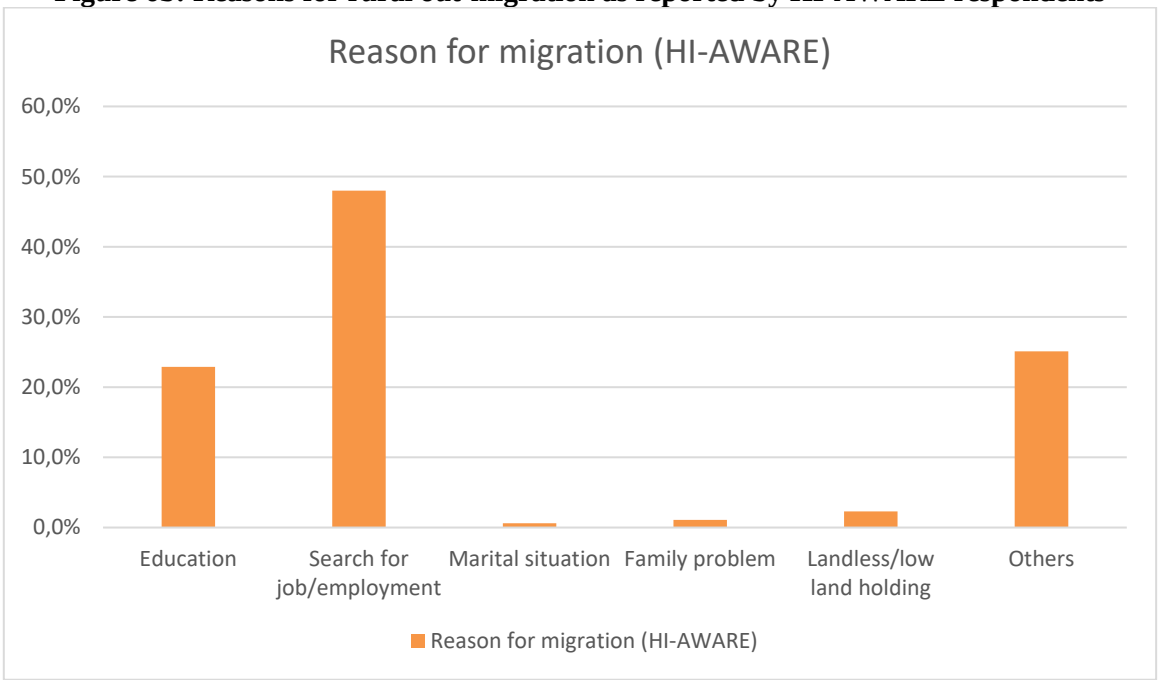
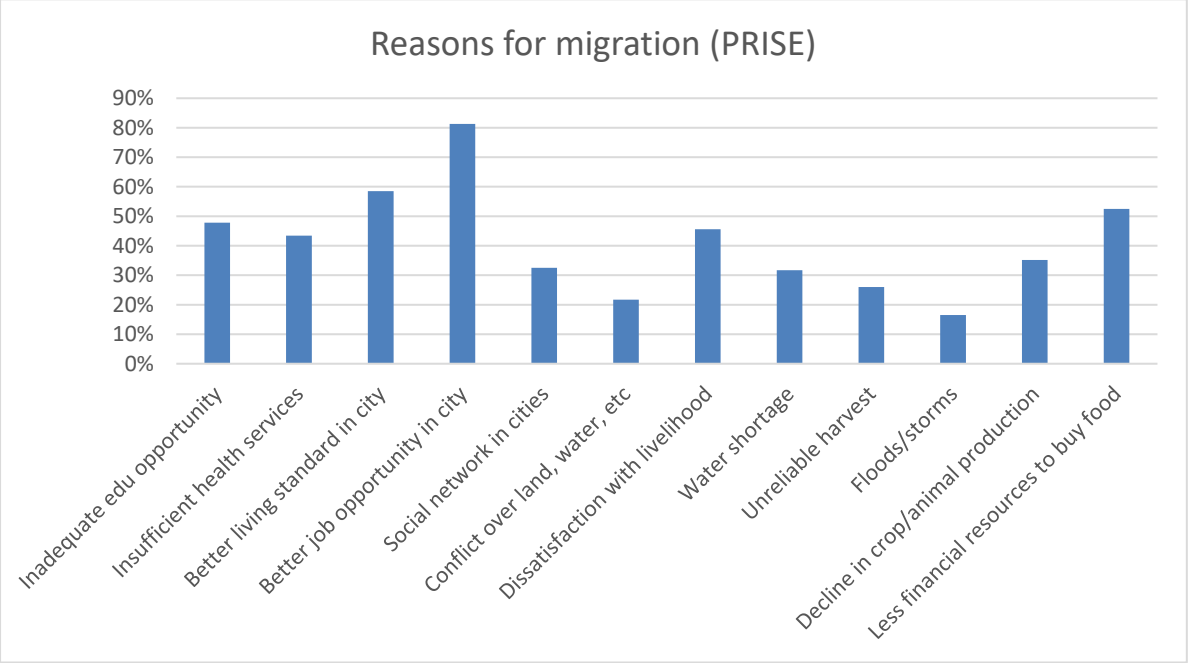


Figure 7: Reasons for rural out-migration as reported by PRISE respondents



Source: Authors' own.

Social drivers of migration were the second most important reasons after economic drivers.[13] More than 50% respondents in the PRISE semi-arid study areas reported that better living standards in urban municipalities and food insecurity in rural settlements were reasons for migration. They also cited inadequate education (48%) and health (43%) services in rural areas as a driver of out-migration. In HI-AWARE study areas (UIB), education was the second most frequently cited reason (23%) for migrating, after employment opportunities.

While the drive to improve human capital was similar for migrants from both study areas, the value attached to migratory social networks was different. In the semi-arid plains, a significant social determinant of migration was access to existing social networks in places of destination (for more than one-third of the households surveyed). Advice from migrant relatives and friends played a critical role in migratory decisions in these areas, but less than 4% respondents in UIB surveyed by HI-AWARE stated that family members or friends in the destination area influenced their decision to migrate.

Political drivers also play an influential role in migratory decisions (Geddes and Jordan 2012). In Faisalabad, dissatisfaction with imperfect inheritance laws (concerning landownership) compelled some (25%) to out-migrate.[14] Similarly, in Sargodha, 5% reported landlessness and/or low landholdings as a driver of migration. In rural Mardan, underdevelopment, wide disparities in income and opportunity, and lack of institutional support seemed to be the underlying factors prompting many non-farming household members to migrate to nearby urban centres.

Even though remote mountain areas are assumed to be more problematic when it comes to property rights and tenure arrangements, respondents from migrant households of Hunza and Nagar did not consider it an influence on the decision to migrate, as only 2% stated that as a reason. However, one

[13] By social drivers, we refer to both social capital – social identity-based networks – and human capital – a function of skills, knowledge, education, health and personal attributes, etc.
[14] It is not clear whether it was just the existence of imperfect laws that compelled them to move, or whether they were the unfortunate victims of these laws who were forced to leave after being disenfranchised from their land.

must be cautious when drawing inferences from this as eviction stemming from legal, informal, or violent land disputes tends to displace the entire household and not just selected individuals. As with semi-arid areas, in the UIB region, the respondents were households who had one or more migrant members, thus, excluding the above category of migrants from the study.

Environmental drivers affect migration in combination with political, economic and social drivers (Black et al. 2011a). Among other influences, migrant households reported that declining crop productivity, complete harvest failure, water contamination, and pest attacks were some of the factors that impelled them to diversify incomes. As a result, 7% of farmer respondents in PRISE areas shifted to livelihoods other than agriculture, while 12% farmers engaged in climate-related migration. While the HI-AWARE study does not directly capture environmental drivers of migration, it can be concluded from the results that erratic rainfalls, increased frequency of climatic extremes affected agricultural incomes as 18% farmers in agriculture, and 35% respondents in the livestock sector in UIB reported a shift towards non-farm activities. Although data is not available, one can presume that at least some members from this group who shifted to non-farm activities later opt to diversify income through out-migration.

3.5. Migration as an adaptation strategy

In the PRISE survey, rural out-migration was most common among respondent households in D.G. Khan (more than 50%), followed by Mardan (38%) and Faisalabad (30%). In the HI-AWARE research, upstream areas of Hunza and Nagar had the highest proportion of migrant households (46%), compared to Sargodha (21%) and mid-stream areas of Rawalpindi and Chakwal (26%).

Environmental disasters and climate extreme events (such as floods, extreme rainfall, landslides, GLOFs, heat waves, etc.) had displaced a significant proportion of rural populations in recent years. In the HI-AWARE study area, 16% respondent households had been displaced due to natural hazards in the past ten years. Of these, respondents in downstream (Sargodha, 21%) and upstream areas (Hunza and Nagar, 22%) were the worse affected, compared to midstream areas (Rawalpindi and Chakwal, 4.5%). Migrant households were as susceptible to climate-induced displacement as non-migrant households (18% and 16%, respectively). They, however, reported greater losses in property compared to non-migrants due to climate extreme events. In the case of PRISE, displacement due to climate hazards was the highest in D.G. Khan (88%).[15] Despite high exposure to recurrent climate disasters in the last five years, most of the farmer households temporarily displaced in D.G. Khan returned upon recession of flood waters. Respondent households in all study sites reported losses in income, property and livestock as a result of climate disasters over the past 5-10 years. Some even reported loss of human life.

In semi-arid regions studied under PRISE, it normally cost anywhere from PKR 10,000-100,000 (about USD 86-864) to move to a town/city, according to respondent estimates. In UIB surveyed under HI-AWARE, the average cost of migration per migrant ranged from PKR 30,000-200,000 (USD 280-1800). However, for households that received remittances, the average remittance amount of PKR 10,000 (USD 92) per month in UIB made it cost effective for the household to sponsor or financially support migration. A quarter of migrant remittances were consumed to cope with climate disasters in HI-AWARE sites; whereas in PRISE areas, 30-40% of migrant remittances were used to purchase food.

Generally, migration seems to be associated with socioeconomic rural issues. For example, in UIB, migration for better work opportunities was highest in Rawalpindi and Chakwal, and lowest in upstream areas of Hunza and Nagar. Unemployment rate was lowest in the midstream areas (Rawalpindi and Chakwal) which had high labour migration rates, while it was highest in Hunza and Nagar.

[15] This figure is for respondent households engaged in the agriculture sector only. Values for households displaced in other PRISE sites is not available.

Much like the PRISE study area, the experience of migration was highly gendered and male-dominated in UIB. Only 6% of the migrants from this study region were female, and they were all from the upstream area of Hunza and Nagar. This is not surprising as these mountain areas are known for higher stress on female education and employment compared to other rural areas of Pakistan. Anecdotal accounts from the region suggest that this 6% is a gross underrepresentation of female migration patterns as households prefer not to report or discuss female migrants. There was negligible female labour migration in Rawalpindi, Chakwal, and Sargodha. Likewise, PRISE study sites also showed negligible female migration, except for marriage. Out-migration of male household members also shifted more responsibilities upon females, who had to undertake additional household chores in addition to childcare and housekeeping.

Section IV: Discussion

Results from the PRISE and HI-AWARE studies indicate that changes in rural livelihoods, and their impact on household food security, has slowly shifted economic reliance away from the agriculture sector. Depending on household and regional differences, anywhere from 20-50% rural households reported financially supporting migration of a household member. Once a household member migrated and their remittances started flowing in, reliance on agricultural incomes further declined, as post-migration, remittances are assumed to form a significant proportion of household revenues.[16] In non-migrant households, livelihood dependence on a single sector (agriculture, livestock or forestry) aggravated livelihood sensitivity to climate risks, as a result of which many were forced to shift to non-farm activities.

Migration is, however, more likely to originate in places that are exposed to rampant food insecurity, economic disparity and deprivation, and rural-urban market inequalities. A study carried out in Ethiopia by Ezra and Kiros (2001) found that migration was more rampant in communities where there was an increased perception of food insecurity, and the need for additional income so as to decrease livelihood vulnerability. While results from the HI-AWARE study do not conclusively point towards food insecurity as a key driver of migration, it appears to be a dominant influencer of migratory decisions in semi-arid plains studied under PRISE. Rural vulnerability in semi-arid areas intensified when food insecurity was paralleled by socioeconomic deprivation. The effect was not only further exposure to climatic and non-climatic risks, but also the erosion of rural incomes and adaptive capacities during shocks and stresses.

An example of this can be found in the correlation between involuntary displacement and migration in both regions studied under PRISE and HI-AWARE. Places that experienced high levels of forced displacement were also associated with high migratory levels. D.G. Khan and Mardan had high exposure to climate disasters over the past eight years. They also exhibited higher levels of migration, compared to Faisalabad. Similarly, Hunza and Nagar, that were prone to climate and environmental hazards, also showed high levels of migration in the HI-AWARE sites. However, there were exceptions too, as Rawalpindi, Chakwal and Sargodha are at comparatively lower-risk to climate disasters (PDMA 2014), yet Rawalpindi and Chakwal had a higher proportion of migrants as compared to Sargodha. Overall, the experience of involuntary temporary resettlement seemed to predispose household members to seek out permanent alternative abodes in order to prevent similar displacement in the future. It is also reasonable to assume that the displacement of households in the vicinity would prompt some rural households to migrate to avoid a similar fate in the future. Hence, among other purposes, migration may be used as a means to adapt to future shocks.

Results from both studies show that rural communities are increasingly perceptible of how climate change affects rural incomes and livelihoods. The majority took autonomous and diverse adaptive measures at the household level, such as change in cropping patterns and increased use of farm inputs. Yet, regardless of how well communities were adapting to slow-onset changes, they remained vulnerable to climate extremes. Climate hazards also affected people in spite of migration status of the household, as discussed above. In fact, losses incurred to migrants during disasters were reportedly higher than non-migrants. This implies that even if communities in hazard-prone areas continue to initiate and autonomously undertake adaptation measures against slow-onset climate change, they remain vulnerable and at risk of exposure to climate extremes, unless critical investments in climate-resilient infrastructure are made at the community and governmental levels. A second implication that can be drawn from the link between climate hazards and increased out-migration is that climate and environmental change (and climate extremes as its proxy) plays some role in migration decisions.

From the results, it appears that climate change may have acted as a ‘macro driver of many kinds of environmental changes’ that triggered shifts in environmental and biophysical conditions (Barnett and Adger 2007). A number of farmers reported shifting away from agriculture as a means to diversify income, when losses were incurred through decline in crop productivity, crop failure, degradation of

[16] Based on household responses in PRISE areas; and average monthly remittance estimates of PKR 10,000 (USD 92) in HI-AWARE sites.

pasturelands, water contamination, and pest attacks. Others adjusted livelihood practices in agriculture, livestock and forestry sector to adapt to a changed climate, as found in a similar study by Abid et al. (2016). In PRISE areas, 12% farmer households engaged in climate-related migration. This indicates that migration outcomes were shaped by complex environmental and climate factors that interacted with economic, socio-political and cultural factors (McLeman and Hunter 2010).

So while environmental and climatic factors alone were important, they represented one set of migratory drivers. At the micro-level, the primary reason for migration was better work opportunities in urban areas and low wages in rural settlements. However, at the macro-scale rural out-migration seemed to be partly controlled by rural-urban market inequalities that were perpetuated by weak labour market institutions (Checchi and García-Peñalosa 2008). Many from the Upper and Middle Indus Basin also migrated to have better access to quality education and health services in urban areas. In the absence of efficient governance, development infrastructure and legal systems to support and protect the poor, rural inequality and marginalisation flourishes. As an outfall of this, many rural residents are pushed out to migrate to diversify their incomes and improve living standards.

Just as the reasons for migration were varied, so were the benefits that accrued from out-migration to communities of migrant origin. Many of these benefits of migration flowed from remittances (Barnett and Chamberlain 2010). Remittances build household resilience by spreading risk and broadening opportunities for human well-being, such as through investments in human and physical capital (Adger et al. 2002; Adams and Adger 2013). Remittances can also help to buffer against climatic and non-climatic shocks. In UIB, about a quarter of the households surveyed used remittances to cope with extreme climatic events. In addition, remittances help meet basic consumption needs (such as food), as was found in the semi-arid regions. When put to productive use, remittances can help increase access to financial capital which can be used for investments in assets (agricultural land), and small businesses – thus, further increasing economic resilience of migrant households (Salik et al. 2017).

However, migration is not easy and comes at a cost. It is conditional upon access to adequate financial resources (Brown 2008), because permanent migration, particularly over long distances, entails heavy financial and social costs and hardship, which is usually pursued by only a minority of communities affected by climate risks and hazards (McLeman and Hunter 2010). Most households chose to stay or adapt in ways other than migration. Due to the hardship and heavy costs, migration in literature is reported to be a last resort adaptation option (Brown 2008; McLeman and Hunter 2010).

Furthermore, migration may have differential impacts for different groups. For example, compared to poorer households that were 'trapped' and left out, wealthier households in PRISE areas that engaged in migration were more likely to offset climate risks, given their access to finances and social capital.[17] Their ready access to credit/loans, and social networks, for example, helped during times of duress (such as floods) to cope with disaster relief and livelihood recovery. This has been shown in multi-country studies elsewhere, such as by Bryan et al. (2009) in South Africa and Ethiopia. Similarly, in a study on UIB, Gioli et al. (2014) concluded that the poorest and most vulnerable are often unable to choose migration as a coping strategy against climate change, because of limited access to financial resources. As a result, they become more vulnerable by dwelling in hazard-prone areas, and climate risks erode their coping capacities further (Klasen 2012 in Ishaq et al. unpublished).

Migration also impacts female members of migrant households differently. As migrant households and communities become more economically viable, women within migrant households may, in fact, be negatively impacted (Kothari 2003 in Barnett and Webber 2010) and their adaptive capacity erodes, as they are burdened with additional household chores and responsibilities (such as looking after livestock) when male members migrate. This, however, needs further investigation, as the two studies did not adequately capture the differential impact of migration on left-behind female household members, given the different *foci* of the studies. While migration shifted power dynamics

[17] See Salik et al. (2017) for more details.

within households when the head migrated, most of the power associated with decision-making, resource allocation and access to remittances was reshuffled back to male members. Given the highly patriarchal culture, women were also excluded from opportunities for labour migration. In rural areas where there was negligible female labour migration, migration seemed to further entrench gender inequalities.

Section V: Conclusion and policy recommendations

This synthesis presented findings from selected areas of Pakistan representing semi-arid plains (for the PRISE study) and UIB (for the HI-AWARE study) where climatic vulnerability is high and rural-to-urban migration is a prominent trend. By synthesising results from the two studies, this paper shows that climate change is a reality in rural settlements, and villagers are increasingly perceptible of its risks. Most of those engaged in natural resource-based sectors are already undertaking adaptive measures in response to these changes. However, climate hazards and risks continue to indiscriminately affect rural residents regardless of household status and their level of adaptation. Moreover, slow-onset changes in the climate seem to drive macro changes in the environment, all of which ultimately interact with economic, social and political factors to determine migratory outcomes. Climate change is, thus, a threat-multiplier that exacerbates existing vulnerabilities and risks in important dimensions of sustainable development.

As a consequence, migration is a common household strategy in rural areas to diversify income and minimise risk against shocks. Coincidently, areas with high proportion of migrant households are also prone to climate and environmental hazards. As a result, a significant proportion of respondents had been displaced in the past, incurring human and monetary losses. During such duress, migrant remittances worked as a buffer against shocks and stresses (such as food insecurity, floods, heat waves, etc.). Where migration occurred, it was both costly and entailed hardships. Nevertheless, the appeal of additional household income in the form of remittances persuaded many to sponsor migration of a household member. Migration also appears to uplift the socioeconomic status of migrant households. However, not all household members benefitted equally from migration, as rural out-migration was male-dominated. Women were not only excluded from opportunities for labour migration, they also had to assume additional household responsibilities when male household members out-migrated. Overall, migration appeared to be an enabling coping strategy against risks and shocks in both study areas.

As discussed in Section II, an important caveat to this synthesis work was its reliance on two independent methodologies, due to which true parallels were not possible. However, effort was made to draw out common trends in migration as an adaptation strategy in rural contexts. This work merits further investigation so that results could be further verified, for example, by replicating PRISE methodology in UIB areas.

Adaptation decision-making within rural areas is the outcome of forces within the household, such as mitigation of risk to income loss; and outside the household, such as agricultural measures to provide new resistant crop varieties; or introduction of on-farm electricity subsidies (Smit and Skinner 2002). For climate change adaptation to be effective, it must be complemented by adaptation measures taken at all tiers of decision-making (i.e. household, local communities, and local and national government levels). Adaptation should be well-planned at the public policy level with well-thought benefits for rural and urban economies both of which are affected by internal migratory flows. More importantly, successful adaptation needs to adjust planning and decision-making systems with considerations for current and future climate change (Smit and Wandel 2006). This is increasingly important because rural households and communities in hazard-prone areas continue to remain vulnerable to climate and non-climatic shocks and stresses, despite engaging in self-initiated adaptation measures. Thus, critical investments need to be made in climate-resilient infrastructure in rural areas (like improving and enlarging road networks, improving irrigation networks and clean drinking water supplies, promoting efficient floodwater diversion and control during monsoon season, climate forecasting, effective disaster preparedness and response, etc.). Additionally, policy issues related to migration and climate adaptation - such as economic development, agriculture, urban development, climate and environmental change, disaster preparedness and response - should not be treated in sectoral silos, rather harmonised to reap maximum benefit for affected sectors and communities.

Socioeconomic and political contexts of human societies also affect rural livelihoods, particularly the agricultural sector – and hence, have a strong potential to impact adaptation measures taken in this

sector (Smit and Skinner 2002). For example, the underlying causes of vulnerability - which were shown to be rooted in socioeconomic deprivation, food insecurity, underdevelopment and rural-urban market inequality in this synthesis - amplify climate risks especially during disasters. Unless these underlying causes of rural vulnerability and out-migration are addressed, rural households will continue to remain exposed to risks which can further erode their incomes and adaptive capacities during shocks and stresses. A critical role can be played by government initiatives, such as the Benazir Income Support Programme (BISP), if their outreach is improved to expand coverage and delivery to households vulnerable to poverty and food insecurity in climate-risk areas.

The research evidence presented in this synthesis reinforces what has been said in recent literature on migration-climate nexus in Pakistan. Rather than being seen as a problem to be solved or contained, migration should be seen as a socioeconomic phenomenon that can enhance rural adaptive capacity and spur rural development (Qaisrani et al. 2017). In areas where migration seems to positively contribute to community adaptation and resilience, investments should be made in facilitating migration in a safe and regulated manner, while also strengthening transport and financial infrastructure for remittances, etc. In other areas, the priority should be to make climate resilience investment in the communities of migrant origin. Based on results presented in this synthesis, the following policy recommendations are proposed:

1. **Developing a national policy on internal migration.**

There is need for a national policy on internal migration in Pakistan which can regularise internal mobility and labour migration, with a focus on rural-to-urban migration. Such a policy should be well integrated into climate change adaptation policies and action plans, as well with relevant sectoral policies and public sector programmes. It should be complemented by investment in research, data collection and capacity building to improve understanding of the migration-climate nexus.

2. **Monitoring and regulating labour market supply-demand gaps.**

Labour market wage differentials are a primary driver of rural-to-urban migration, therefore, a mechanism needs to be developed that can monitor and regulate labour market supply-demand gaps, such as the dearth of labour in a particular urban setting, and its surplus in a rural market. Such a mechanism can help regulate labour mobility in internal migration hotspots (such as the Upper Indus Basin) by ‘match-making’ demand and supply of labour (skills and needs).

3. **Promoting rural livelihood diversification.**

There is a need to promote rural livelihood diversification through extensive programmes focusing on the rural workforce that is increasingly shifting away from agriculture, and is in search of alternative livelihoods. For such populations, there is a need to introduce technical and vocational training programmes, with a particular focus on rural women.

4. **Strengthening social safety programmes, access to health/education services, and investments in climate-resilient infrastructure.**

The underlying causes of rural vulnerability need to be rooted out by strengthening social safety programmes that target poverty reduction, boost food security, and social equality in rural areas, with a particular focus on vulnerable groups, such as women. There is also a need for improvements in access to health and education services, in addition to investments in climate-resilient infrastructure.

5. **Improving rural fiscal resilience.**

Rural areas need to be provided institutional support for improved fiscal resilience. Migrant households could be given advisory support, for example, about where to invest their remittances in a way that can enhance both resilience and livelihoods of households. Efforts should be made to

improve access to formal channels of credit to rural communities, especially small and subsistence farmers, because access to credit and loans is critical for rural households in adapting to climate change and coping during climate disasters and duress.

6. **Enhancing service and delivery of agricultural extension programmes.**

Rural support for climate adaptation should also aim to improve service and delivery of rural agricultural extension programmes. The government should start initiatives that support small farmers' market linkages, access to credit, technology, and livelihood-relevant climate knowledge.

References

Abid, M., Schilling, J., Scheffran, J. and Zulfiqar, F. (2016). Climate Change Vulnerability, Adaptation and Risk Perceptions at Farm Level in Punjab, Pakistan. Science of the Total Environment 547, 447-460.

Adams, H. and Adger, W.N. (2013). Changing Places: Migration and Adaptation to Climate Change. London: Routledge-Earthscan.

ADB (2017). 'Climate Change Profile of Pakistan.' [Online]. Asian Development Bank. Available from: https://www.adb.org/sites/default/files/publication/357876/climate-change-profile-pakistan.pdf [Accessed 3 February 2018].

Adger, W.N., Dessai, S., Goulden, M., Hulme, M., and Lorenzoni, I. et al. (2009). Are there Social Limits to Adaptation to Climate Change? Climatic Change 93(3-4), 335-354.

Adger, W.N., Huq, S., Brown, K., Conway, D. and Hulme, M. (2003). Adaptation to Climate Change in the Developing World. Progress in Development Studies 3(3), 179-195.

Adger, W.N., Kelly, P.M., Winkels, A., Huy, L.Q. and Locke, C. (2002). Migration, Remittances, Livelihood Trajectories, and Social Resilience. AMBIO: A Journal of the Human Environment 31(4), 358-366.

Agrawal, A. (2008). The Role of Local Institutions in Adaptation to Climate Change. Washington, D.C.: The World Bank. Available from: http://www.icarus.info/wp-content/uploads/2009/11/agrawal-adaptation-institutions-livelihoods.pdf [Accessed 18 March 2018].

Arif, G.M. (2005). Internal Migration and Household Well-being: Myth or Reality. Internal Labour Migration in Pakistan. Chapter 3. Chiba, Japan: Institute of Developing Economies, Japan External Trade Organisation. 71-94.

Banerjee, S., Gerlitz, J. Y. and Hoermann, B. (2011). 'Labour Migration as a Response Strategy to Water Hazards in the Hindu Kush-Himalayas.' Kathmandu: International Centre for Integrated Mountain Development. Available from: http://lib.icimod.org/record/26921/files/attachment_739.pdf [Accessed 13 February 2018].

Barnett, J. and Adger, W.N. (2007). Climate Change, Human Security and Violent Conflict. Political Geography 26(6), 639-655.

Barnett, J. and Chamberlain, N. (2010). Migration as Climate Change Adaptation: Implications for the Pacific. In: Burson, B. (ed.) Climate Change and Migration, South Pacific Perspectives. Wellington, New Zealand: Institute of Policy Studies, Victoria University of Wellington. pp.51-60. Available from: http://ips.ac.nz/publications/files/f3e24ba00a5.pdf.

Barnett, J. and Webber, M. (2010). Accommodating Migration to Promote Adaptation to Climate Change. [Online]. Washington, D.C.: The World Bank. Available from: http://documents.worldbank.org/curated/en/765111468326385012/pdf/WPS5270.pdf [Accessed 25 February 2018].

Black, R. and Sward, J. (2009). 'Migration, Poverty Reduction Strategies and Human Development.' Human Development Research Paper 2009/38. United Nations Development Program. https://mpra.ub.uni-muenchen.de/19222/1/MPRA_paper_19222.pdf [Accessed 13 February 2018].

Black, R., Adger, N., Arnell, N., Dercon, S., Geddes, A. and Thomas, D. (2011a). 'Foresight: Migration and Global Environmental Change - Future Challenges and Opportunities.' Final Project Report [Online]. London: The Government Office for Science. Available from: http://eprints.soas.ac.uk/22475/1/11-1116-migration-and-global-environmental-change.pdf [Accessed 31 January 2018].

Black, R., Bennett, S.R., Thomas, S.M. and Beddington, J.R. (2011b). Climate Change: Migration as Adaptation. Nature 478(7370), 447.

Brown, O. (2008). Migration and Climate Change. Research Series Paper no. 31. Geneva: International Organisation for Migration.

Bryan, E., Deressa, T.T., Gbetibouo, G.A. and Ringler, C. (2009). Adaptation to Climate Change in Ethiopia and South Africa: Options and Constraints. Environmental Science & Policy 12(4), 413-426.

Checchi, D. and García-Peñalosa, C. (2008). Labour Market Institutions and Income Inequality. Economic Policy 23(56), 602-649.

De Haas, H. (2010). Migration and Development: A Theoretical Perspective. International Migration Review 44(1), 227-264.

Ebrahim, Z. (2010). 'Pakistan: Lake Disaster Triggers New Displacement.' [Online]. Inter Press Service News Agency. Available from: http://www.ipsnews.net/2010/05/pakistan-lake-disaster-triggers-new-displacements/ [Accessed 3 March 2018].

Etzo, I. (2008). Internal Migration: A Review of the Literature. Munich Personal RePEc Archive (MPRA) Paper no. 8783. Available from: https://mpra.ub.uni-muenchen.de/8783/1/MPRA_paper_8783.pdf [Accessed 2 February 2018].

Ezra, M. and Kiros, G.E. (2001). Rural Out-migration in the Drought Prone Areas of Ethiopia: A Multilevel Analysis. International Migration Review 35(3), 749-771.

FAO and Aquastat (2011). Pakistan: Geography, Climate and Population [Online]. Italy: Food and Agriculture Organisation of the United Nations. Available from: http://www.fao.org/nr/water/aquastat/countries_regions/PAK/PAK-CP_eng.pdf [Accessed 15 March 2018].

Fowler, H.J. and Archer, D.R. (2006). Conflicting Signals of Climatic Change in the Upper Indus Basin. Journal of Climate 19(17). 4276-4293.

Geddes, A. and Jordan, A. (2012). Migration as Adaptation? Exploring the Scope for Coordinating Environmental and Migration Policies in the European Union. Environment and Planning C: Government and Policy 30(6), 1029-1044.

Gioli, G., Khan, T. and Scheffran, J. (2014). Climatic and Environmental Change in the Karakoram: Making Sense of Community Perceptions and Adaptation Strategies. Regional Environmental Change 14(3), 1151-1162.

GoP (2017). Pakistan Economic Survey 2016-17 [Online]. Ministry of Finance. Government of Pakistan. Available from: http://www.finance.gov.pk/survey_1617.html [Accessed 12 March 2018].

GoP and UNDP (2016). Multidimensional Poverty in Pakistan: Key Messages. Islamabad: Government of Pakistan and United Nations Development Programme. Available from: http://www.pk.undp.org/content/pakistan/en/home/library/hiv_aids/Multidimensional-Poverty-in-Pakistan.html [Accessed 19 March 2018].

GoP (2013). Framework for Implementation of Climate Change Policy 2014-2030. Ministry of Climate Change. Government of Pakistan.

GoP and UNEP (2013). Climate Change – Past and Future Trends. The Environment Climate Change Outlook of Pakistan. Chapter 6. Islamabad: Government of Pakistan and United Nations Environment Programme.

GoP (2012). National Climate Change Policy. Ministry of Climate Change. Government of Pakistan.

Hussain, S.S., Mudasser, M., Sheikh, M.M. and Manzoor, N. (2005). Climate Change and Variability in Mountain Regions of Pakistan: Implications for Water and Agriculture. Pakistan Journal of Meteorology 2(4), 75-90.

IPCC (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability, Part A: Global and Sectoral Aspects. In: Field, C. B., Barros, V. R., Dokken, D. J., Mach, K. J. and Mastrandrea, M. D. et al. (eds.) Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge and New York: Cambridge University Press. pp.1132. Available from: http://www.ipcc.ch/report/ar5/wg2/ [Accessed 29 March 2018].

IPCC (2013). Climate Change 2013: The Physical Science Basis. In: Stocker, T. F., Qin, D., Plattner, G.K., Tignor, M. and Allen, S. K. et al. (eds.). Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge and New York: Cambridge University Press. pp.1535. Available from: http://www.climatechange2013.org/report/full-report/ [Accessed 29 March 2018].

Irfan, M. (2011). 'Remittances and Poverty Linkages in Pakistan: Evidence and Some Suggestions for Further Analysis.' Pakistan Institute of Development Economics (PIDE) Working Paper 2011:78. Available from: https://core.ac.uk/download/pdf/6503121.pdf [Accessed 28 March 2018].

Ishaq, S., Ahmad, B. and Saeed, B. A. (unpublished). Migration in the Lives of Environmentally Stressed Population in the Indus River Basins. HI-AWARE Paper.

Ishfaq, S., Ahmed, V., Hassan, D. and Javed, A. (2017). Internal Migration and Labour Mobility in Pakistan. In: Rajan, S.I. (ed.) South Asia Migration Report 2017: Recruitment, Remittances, and Reintegration. New Delhi: Routledge. 321-342.

Islam, S., Rehman, N. and Sheikh, M.M. (2009). Future Change in the Frequency of Warm and Cold Spells over Pakistan simulated by the PRECIS Regional Climate Model. Climatic Change 94(1-2). 35-45.

Khattak, M.S., Babel, M.S. and Sharif, M. (2011). Hydro-meteorological Trends in the Upper Indus River Basin in Pakistan. Climate Research 46(2),103-119.

Klasen, S. (2012). Gender, Growth and Adaptation to Climate Change. In: UNDP (ed.). Powerful Synergies: Gender Equality, Economic Development and Environmental Sustainability. New York: United Nations Development Programme. pp. 59-69.

Kolev, A. (2013). Labour Migration and Development: A Critical Review of a Controversial Debate. In: Cazes, S. and Verick, S. (eds.). Perspective on Labour Economics for Development. Chapter 6: Geneva: International Labour Office. pp. 119-160. Available from: http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_190112.pdf [Accessed 27 January 2018].

Kothari, U. (2003). Staying put and Staying poor? Journal of International Development 15, 645-657.

Mazumdar, D. (1987). Rural-urban Migration in Developing Countries. In: Handbook of Regional and Urban Economics vol. 2. Elsevier. pp. 1097-1128.

McLeman, R and Hunter, L. M. (2010). Migration in the Context of Vulnerability and Adaptation to Climate Change: Insights from Analogues. Wiley Interdisciplinary Reviews: Climate Change 1(3), 450-461.

McLeman, R. and Smit, B. (2006). Migration as an Adaptation to Climate Change. Climatic Change 76(1-2), 31-53.

Messerli, B., Viviroli, D. and Weingartner, R. (2004). Mountains of the World: Vulnerable Water Towers for the 21st Century. Ambio Special Report 13, 29-34. Available from: https://www.researchgate.net/profile/Bruno_Messerli/publication/8152808_Mountains_of_the_World_Vulnerable_Water_Towers_for_the_21st_Century/links/0a85e53777efd3888c000000/Mountains-of-the-World-Vulnerable-Water-Towers-for-the-21st-Century.pdf [Accessed 27 January 2018].

Milan, A., Gioli, G. and Afifi, T. (2015). Migration and Global Environmental Change: Methodological Lessons from Mountain Areas of the Global South. Earth System Dynamics 6(1), 375-388.

Mueller, V., Gray, C. and Kosec, K. (2014). Heat Stress increases Long-term Human Migration in Rural Pakistan. Nature Climate Change 4(3), 182.

Otto, I.M., Reckien, D., Reyer, C.P., Marcus, R. and Le Masson, V. et al. (2017). Social Vulnerability to Climate Change: A Review of Concepts and Evidence. Regional Environmental Change 17(6), 1651-1662.

Pachauri, R.K. and Reisinger, A. eds. (2007). *Climate Change 2007 Synthesis Report: Summary for Policymakers*. Geneva: IPCC Secretariat.

PBS (2017). 'Provisional Summary Results of 6th Population and Housing Census-2017.' Pakistan Bureau of Statistics. Government of Pakistan. Available from: http://www.pbs.gov.pk/content/provisional-summary-results-6th-population-and-housing-census-2017-0 [Accessed 27 January 2018].

PDMA (2014). Punjab Disaster Response Plan. Provincial Disaster Management Authority. Government of Punjab. Available from: http://pdma.gop.pk/system/files/Punjab%20Disaster%20Response%20Plan%2C%202014_0.pdf [Accessed 8 March 2018].

Porter, L. and Davoudi, S. (2012). The Politics of Resilience for Planning: A Cautionary Note. Planning Theory and Practice 13(2), 329-333.

Qaisrani, A. and Salik, K. M. (2018). The Road to Climate Resilience: Migration as an Adaptation Strategy. PRISE Policy Brief. Islamabad: Sustainable Development Policy Institute.

Qaisrani, A., Umar, M. A., Siyal, G. A. and Salik, K. M. (2017). Rural Livelihood Vulnerability and Scope of Migration as an Adaptation Strategy in Semi-arid Pakistan. PRISE Working Paper. Islamabad: Sustainable Development Policy Institute.

Saeed, F., Salik, K.M. and Ishfaq, S. (2016). Climate Induced Rural-to-Urban Migration in Pakistan. PRISE Working Paper [Online]. Islamabad: Sustainable Development Policy Institute. Available from: http://prise.odi.org/wp-content/uploads/2016/01/Low_Res-Climate-induced-rural-to-urban-migration-in-Pakistan.Pdf [Accessed 13 February 2018].

Salik, K.M., Qaisrani, A., Umar, M.A. and Ali, S.M. (2017). Migration Futures in Asia and Africa: Economic Opportunities and Distributional Effects – The Case of Pakistan. PRISE Working Paper [Online]. Islamabad: Sustainable Development Policy Institute. Available from: https://think-asia.org/bitstream/handle/11540/7572/migration-futures-in-asia-and-africa-economic-opportunities-and-distributional-effects-pakistan-low-res.pdf?sequence=1 [Accessed 13 February 2018].

Sattar, A. (2013). Migration, Water Stress and Climate Change in the Indus Delta: A Scoping Study. Available from: http://bdro.org/wp-content/uploads/2013/04/Indus-Delta-MIGRATION-study.pdf [Accessed 10 March 2018].

Sheikh, M.M., Manzoor, N., Adnan, M., Ashraf, J. and Khan, A.M. (2009). ‘Climate Profile and Past Climate Changes in Pakistan.’ GCISC Report No. RR-01. Islamabad: Global Change Impact Studies Centre.

Smit, B. and Skinner, M.W. (2002). Adaptation Options in Agriculture to Climate Change: A Typology. Mitigation and Adaptation Strategies for Global Change 7(1), 85-114.

Smit, B. and Wandel, J. (2006). Adaptation, Adaptive Capacity and Vulnerability. Global Environmental Change 16(3), 282-292.

The Express Tribune (2015). ‘2300 Houses Damaged in D.G. Khan.’ [Online] Available from: https://tribune.com.pk/story/935806/2300-houses-damaged-in-dg-khan-floods/ [Accessed 23 February 2018].

The World Bank (2018). World Bank Country and Lending Groups: Country Classification [Online]. Available from: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups [Accessed 21 January 2018].

Treydte, K.S., Schleser, G.H., Helle, G., Frank, D.C. and Winiger, M. et al. (2006). The Twentieth Century was the Wettest Period in Northern Pakistan over the Past Millennium. Nature 440(7088), 1179.

United Nations (n.d.). Addressing Drivers of Migration, Including Adverse Effects of Climate Change, Natural Disasters and Human-Made Crises, through Protection and Assistance, Sustainable Development, Poverty Eradication, Conflict Prevention and Resolution. Issue Brief # 2, [Online]. Available from: https://refugeesmigrants.un.org/sites/default/files/issue_brief_ts2_final.pdf [Accessed 21 January 2018].